

EU Fisheries Management: *MSY* and Beyond

Rainer Froese

GEOMAR, Kiel, Germany

rfroese@geomar.de

presentation at *Race to Save the Baltic*

Stockholm, 28th June 2012

Overview

- Four Terms
- Legal Background
- Status of European Fish Stocks
- Status of the CFP Reform
- *MSY* concept applied to the Baltic
- Ecosystem-based Fisheries Management in the Baltic
- Conclusions

Four Terms

- **Biomass (B)** is the body-weight of the fish in the water
- **MSY** is the **M**aximum **S**ustainable **Y**ield that can be taken from a population (=stock) of fish indefinitely
- **B_{msy}** is the **biomass** that a fish stock must have, so that it can deliver the maximum sustainable yield **MSY**
- **F_{msy}** is the fishing pressure (the proportion of fish killed by fishing) resulting in **B_{msy}**

Legal Background

The Law of the Sea

- The Law of the Sea (UNCLOS 1982) requires all signatories to maintain fish stocks at levels that can produce the maximum sustainable yield MSY
- UNFSA (1995) Annex II specifies that the fishing rate F may not exceed F_{msy} and that F_{msy} may be used as a target during rebuilding, but has to be used as a limit thereafter. Thus, after rebuilding, $F_{target} < F_{msy}$

Why *MSY* is a Good Concept

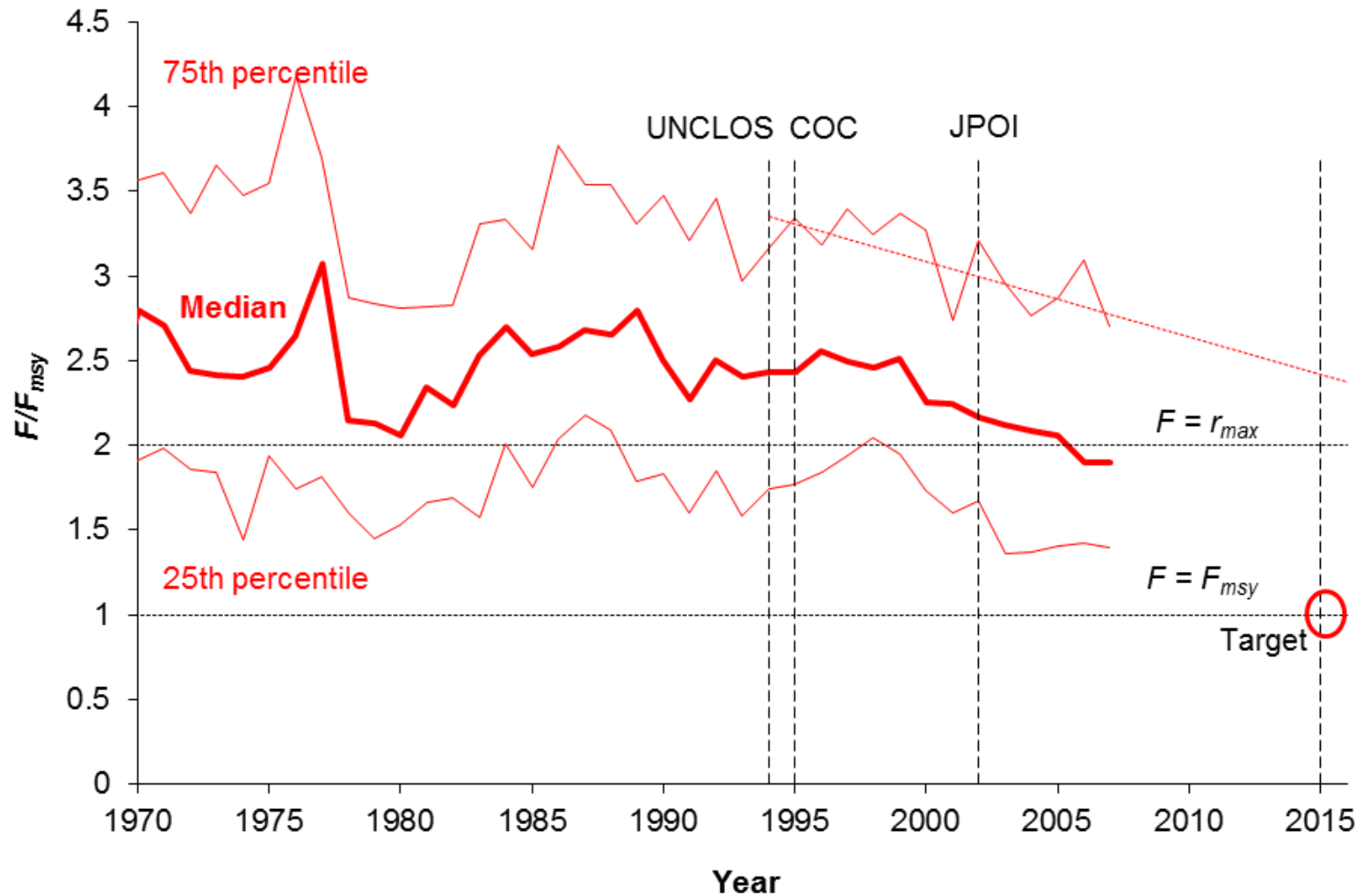
Below *MSY* Level

- Stressed ecosystems
- Small fish
- Small stock size
- High fluctuations
- Low, uncertain catch
- High effort /cost
- Low / no profit
- Low impact impossible
- MPAs problematic
- Subsidies necessary
- Social status low (stubborn overexploiters)

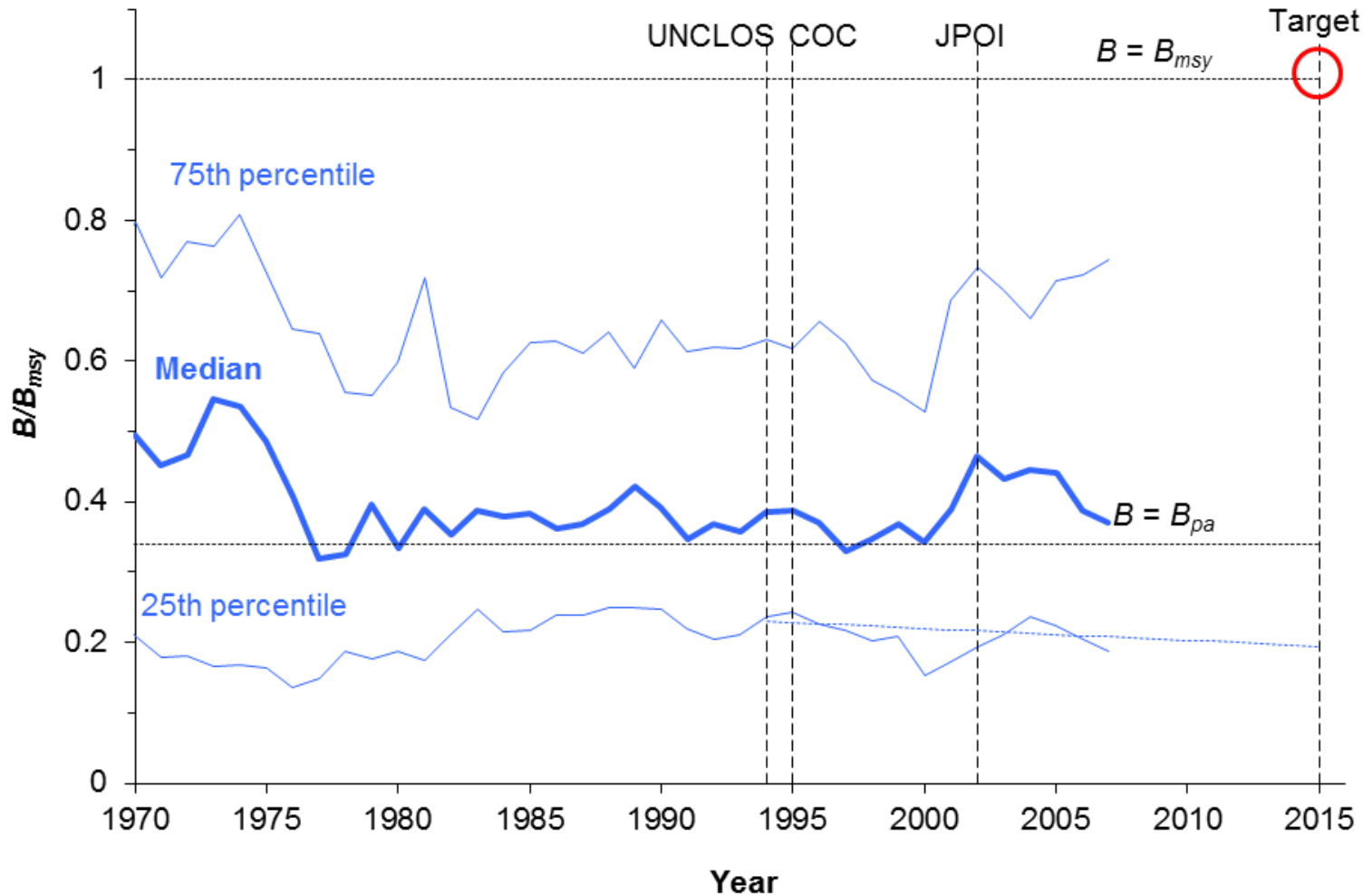
Above *MSY* Level

- Healthy ecosystems
- Large fish
- Large stock sizes
- Low fluctuations
- High, certain catch
- Low effort /cost
- High profit
- Low impact possible
- MPAs unproblematic
- Subsidies not necessary
- Social status high (respected custodians)

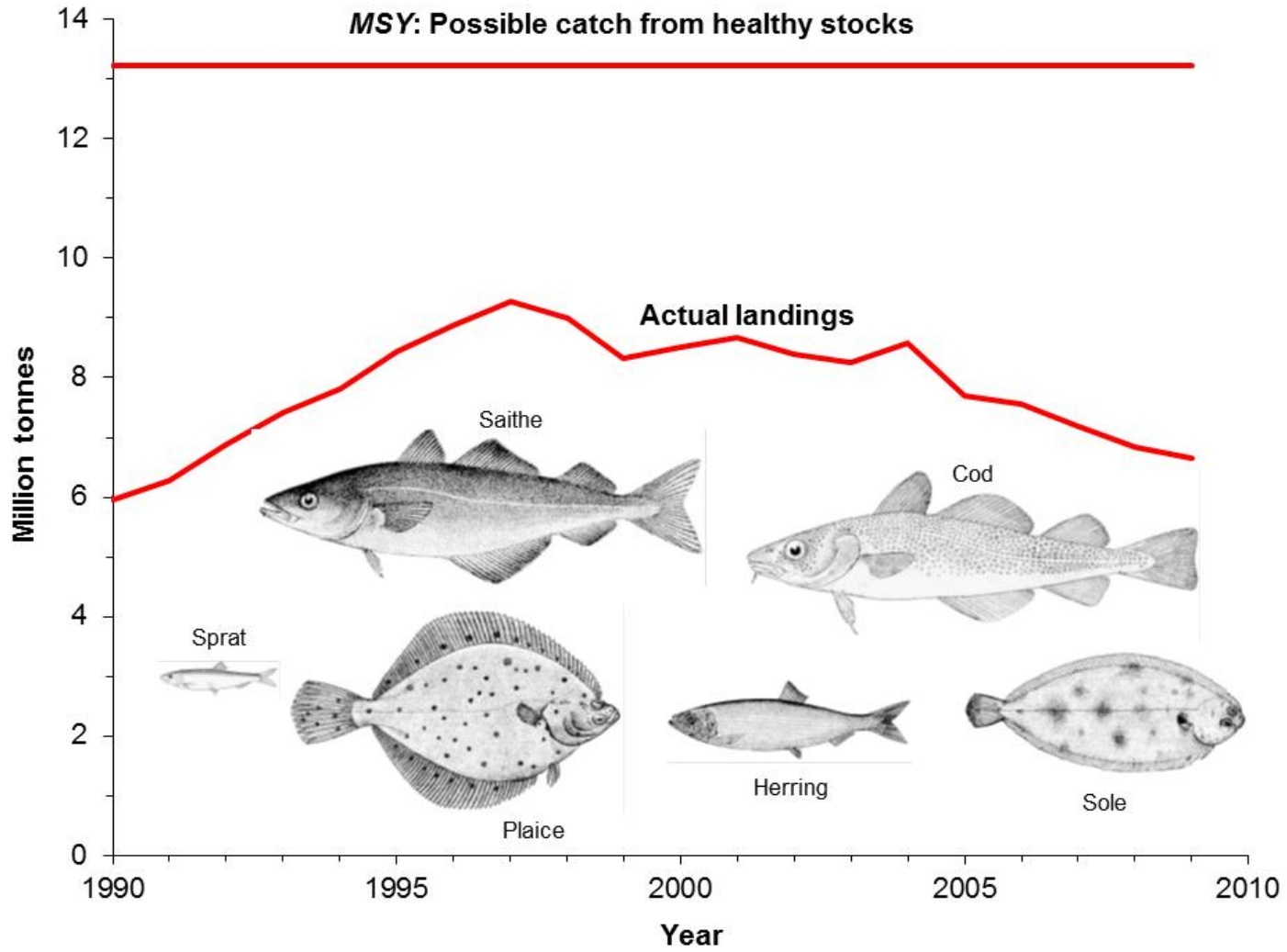
Time series of F in Europe



Time series of Biomass in Europe



Status of European Fish Stocks



Actual and potential catch from 56 stocks in northern European waters Fishdrawings: FAO

News from Rio +20

Article 168 of the *Outcome of the Conference* deals with fisheries:

- Governments commit to intensify efforts to restore stocks at least to MSY levels
- They commit to urgent measures, „including by reducing or suspending fishing...“
- They stress that respective international agreements have to be applied

News from the CFP Reform

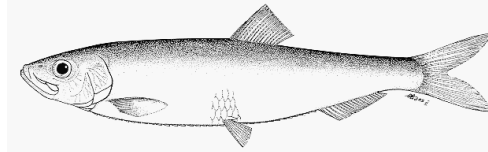
- The Commission (Maria Damanaki) has presented a reasonable CFP reform proposal (although less than Rio +20)
- The Council of Agriculture Ministers has recently decided upon its 'compromise' position
- The European Parliament will present its position in November, then a new compromise has to be negotiated

The Council Compromise

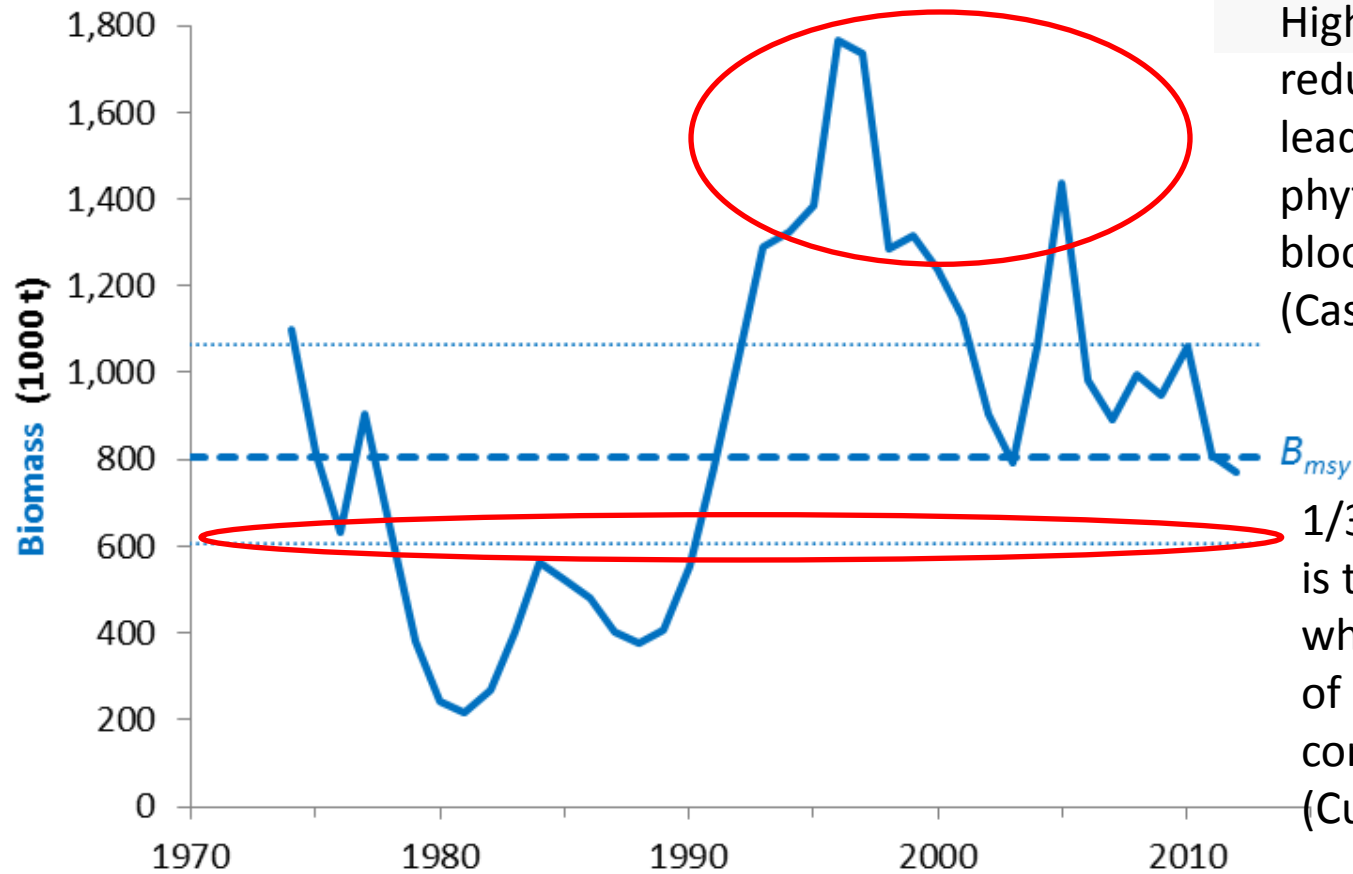
- Postpones sustainable fishing for stocks without F_{msy} estimates until 2020
- Proposes an administrative monster for reduction of discards until 2020
- Introduces lots of loopholes for continued overfishing, e.g. of vulnerable species in mixed fisheries

MSY Concept Applied to the Central Baltic

Baltic Sprat



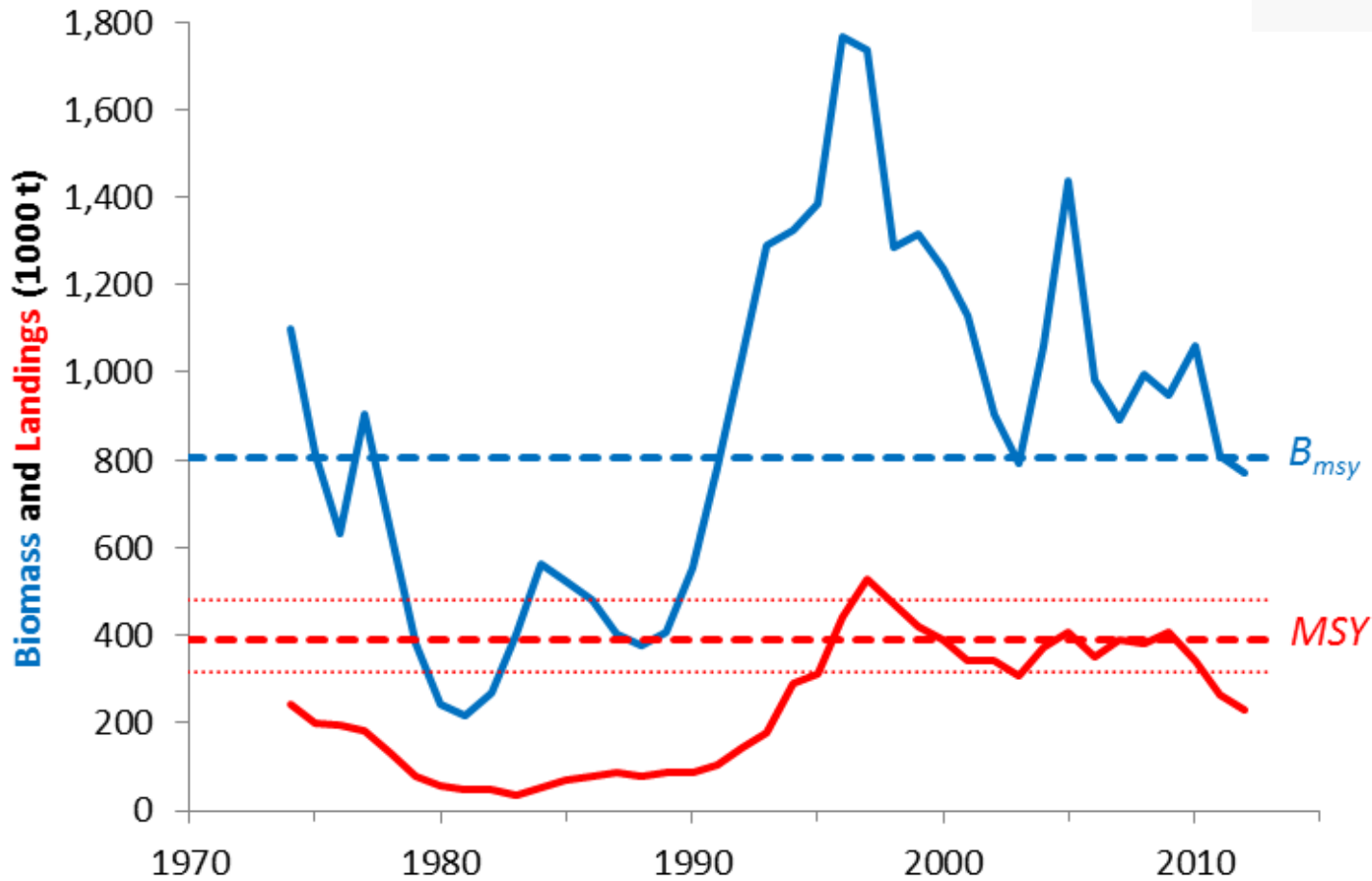
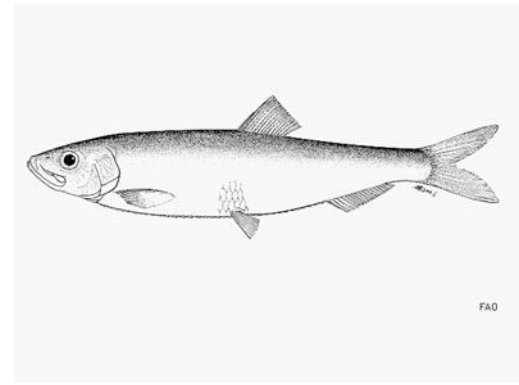
FAO



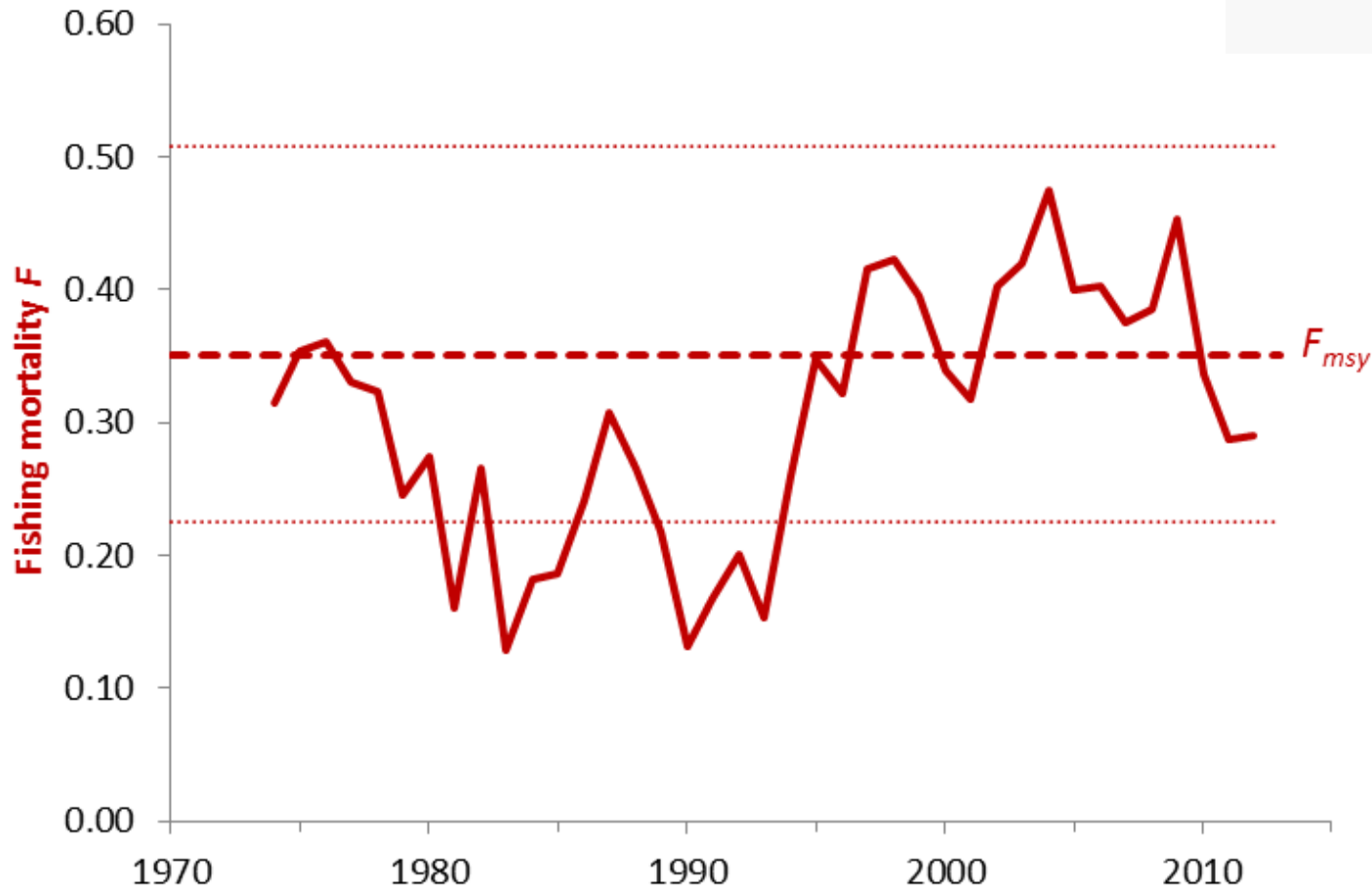
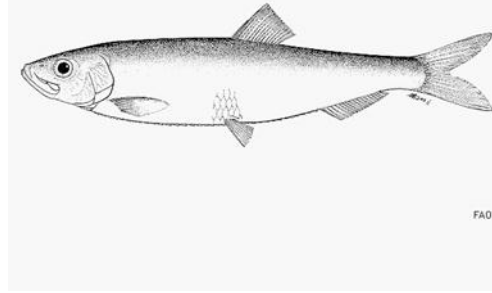
High sprat biomass reduces grazers leading to phytoplankton blooms (Casini et al. 2008)

1/3 of max biomass is threshold below which reproduction of seabirds is compromised (Cury et al. 2011)

Baltic Sprat

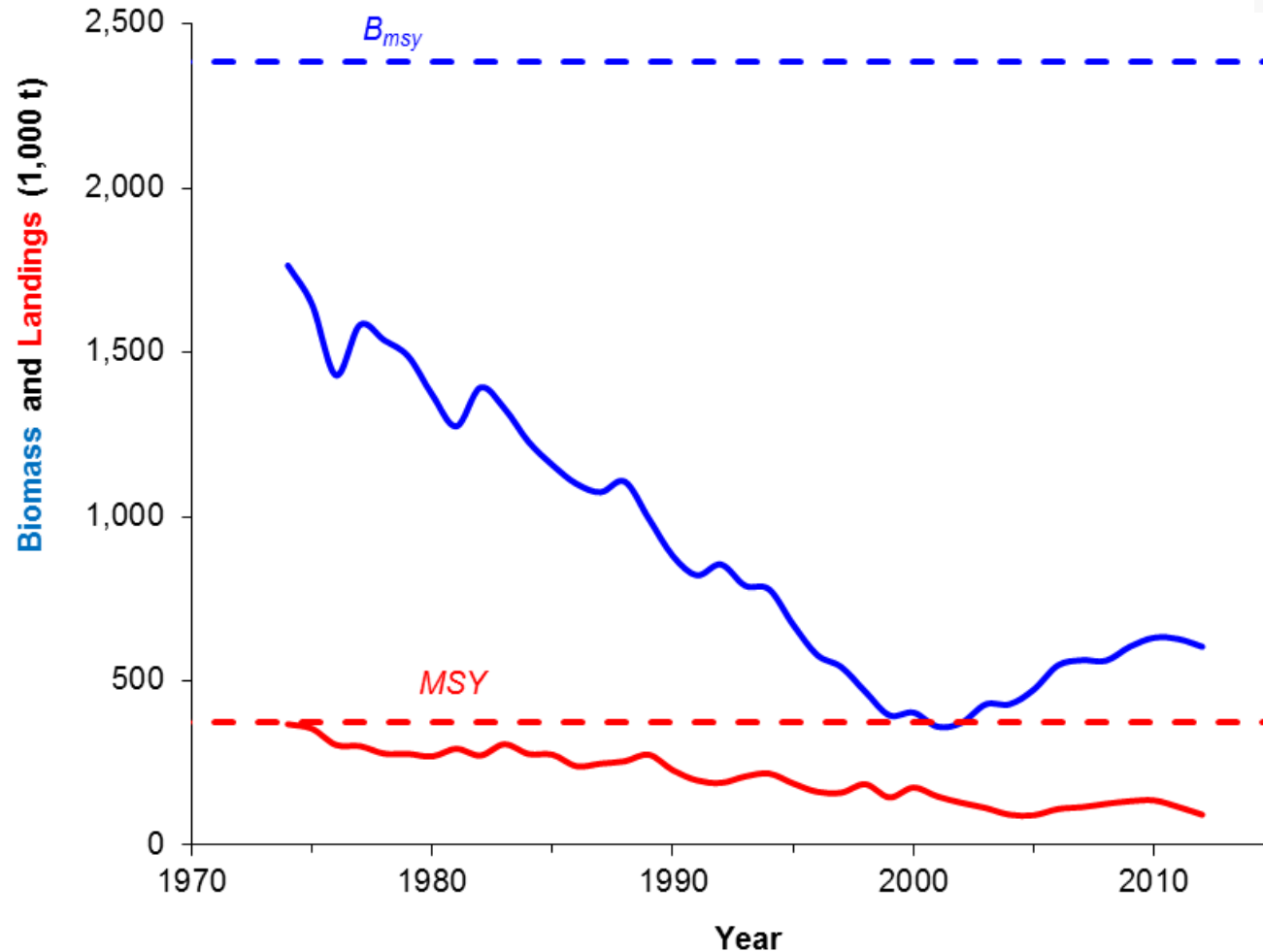
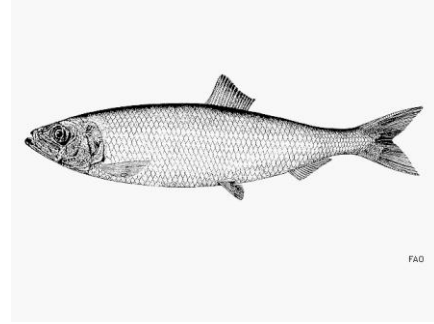


Baltic Sprat

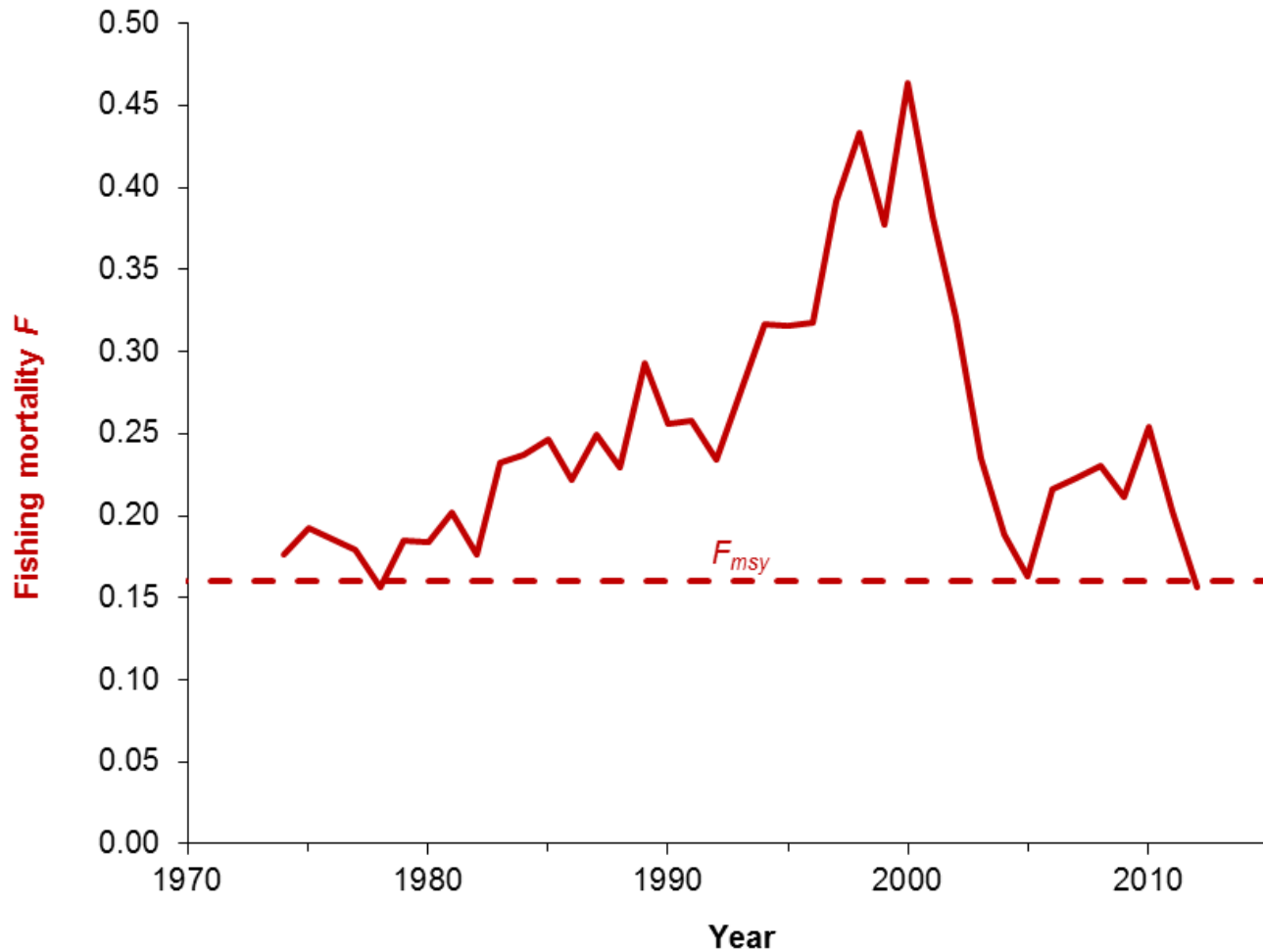


F and F_{msy} from ICES, error margins from Froese & Proelss 2010

Central Baltic Herring

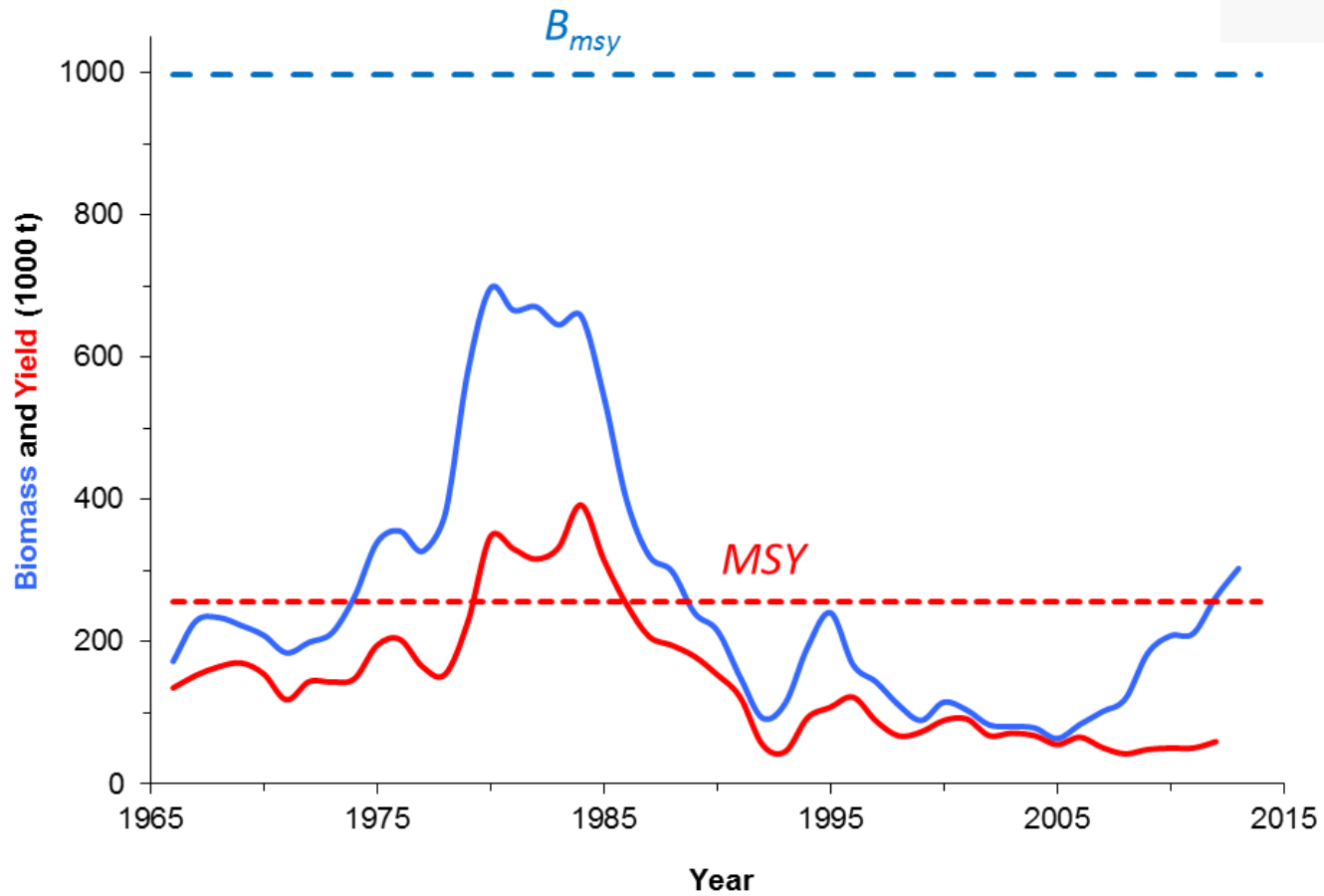
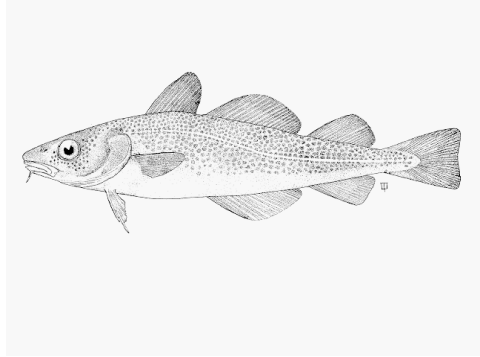


Central Baltic Herring

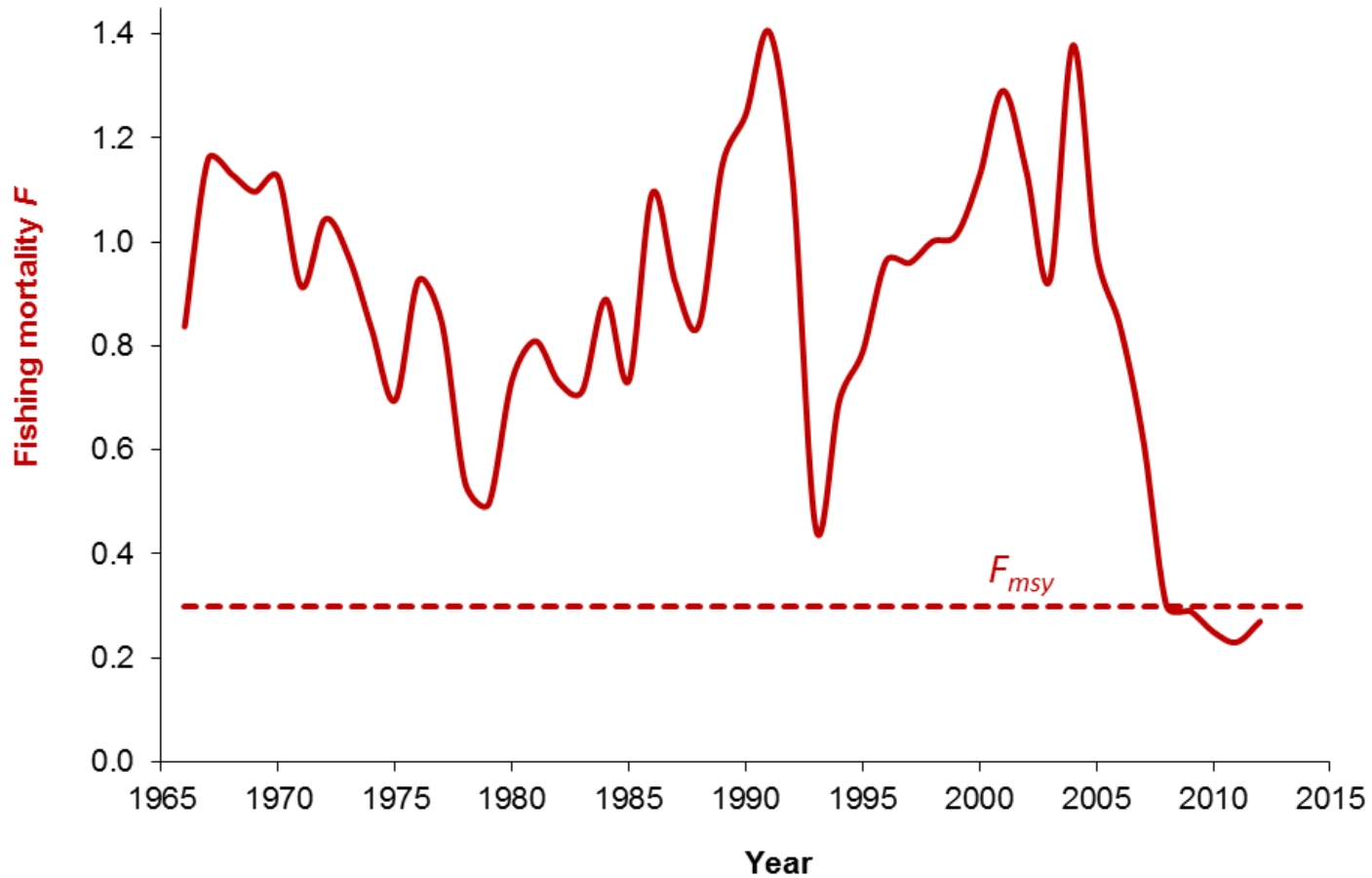
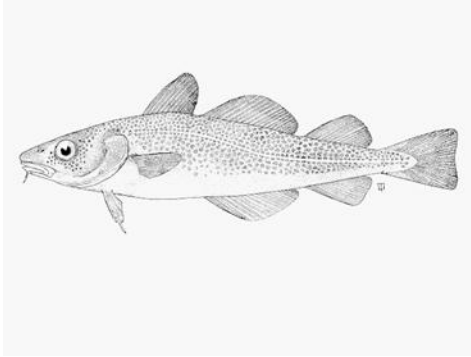


F and F_{msy} from ICES

Central/Eastern Baltic Cod



Central/Eastern Baltic Cod



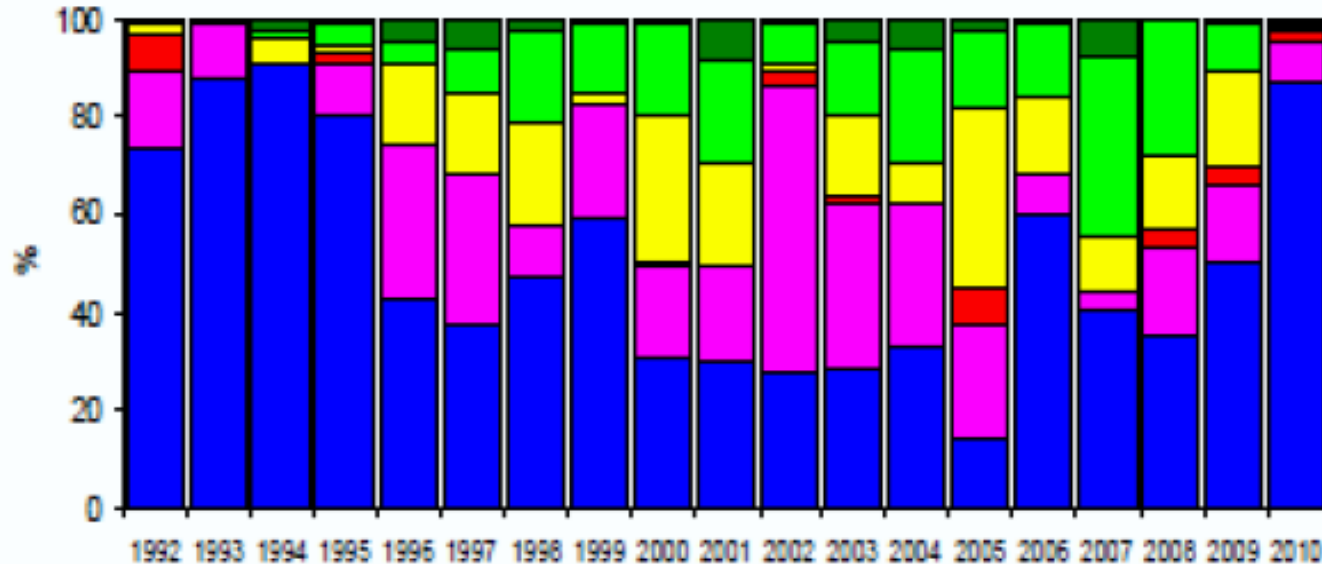
F and F_{msy} from ICES

Principles of Ecosystem-Based Fisheries Management

- Overall goal: Extract *pretty good catches* with least impact on the stocks and on the ecosystem
- Consider species-interactions:
 - Do not cause more mortality than all other predators combined ($F \leq M$)
 - Leave enough biomass of forage fish ($F \leq 2/3 M$)

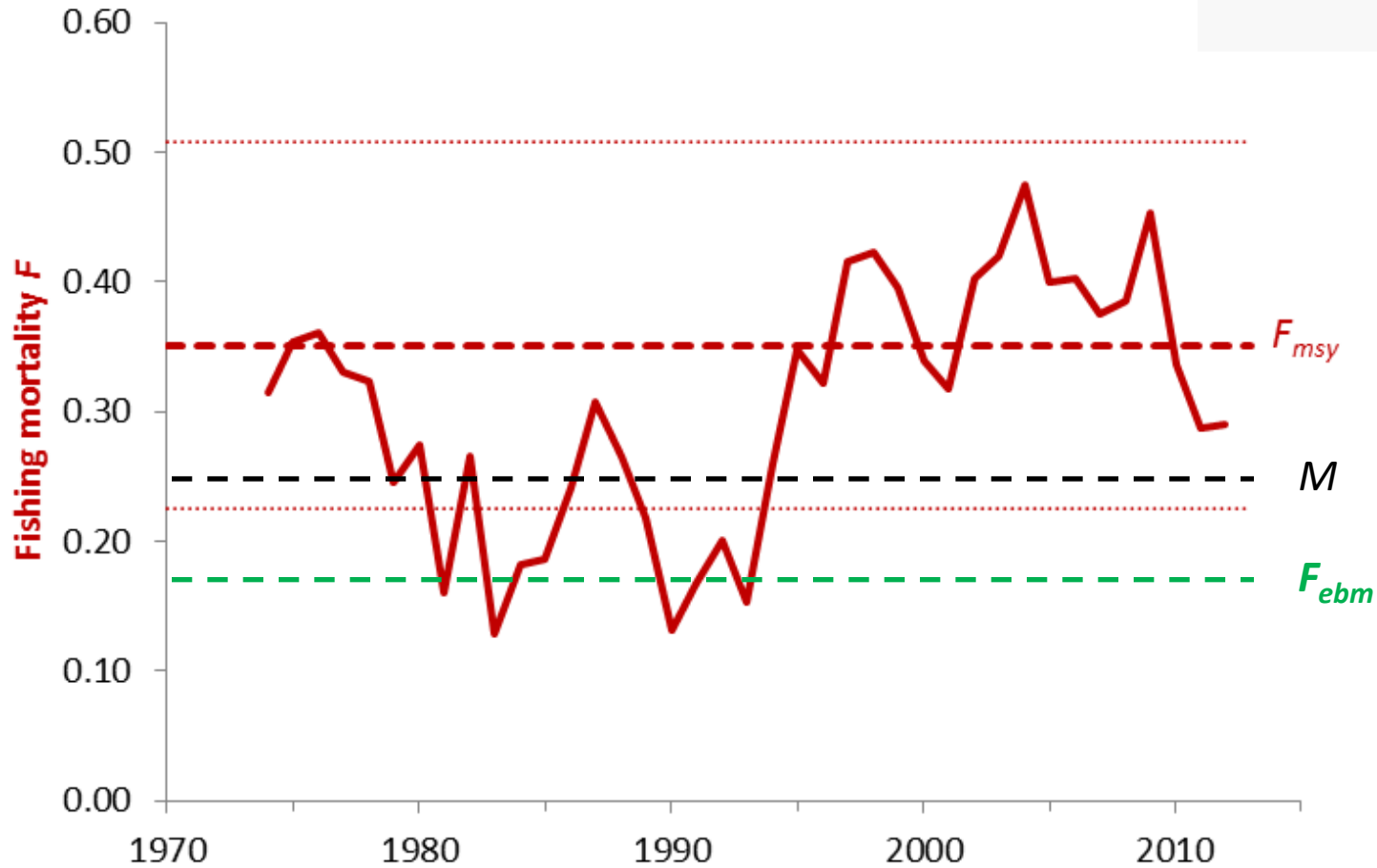
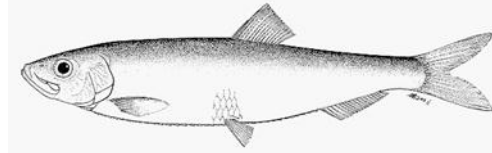
(Pikitch et al. 2012)

Baltic Cod Stomach Content

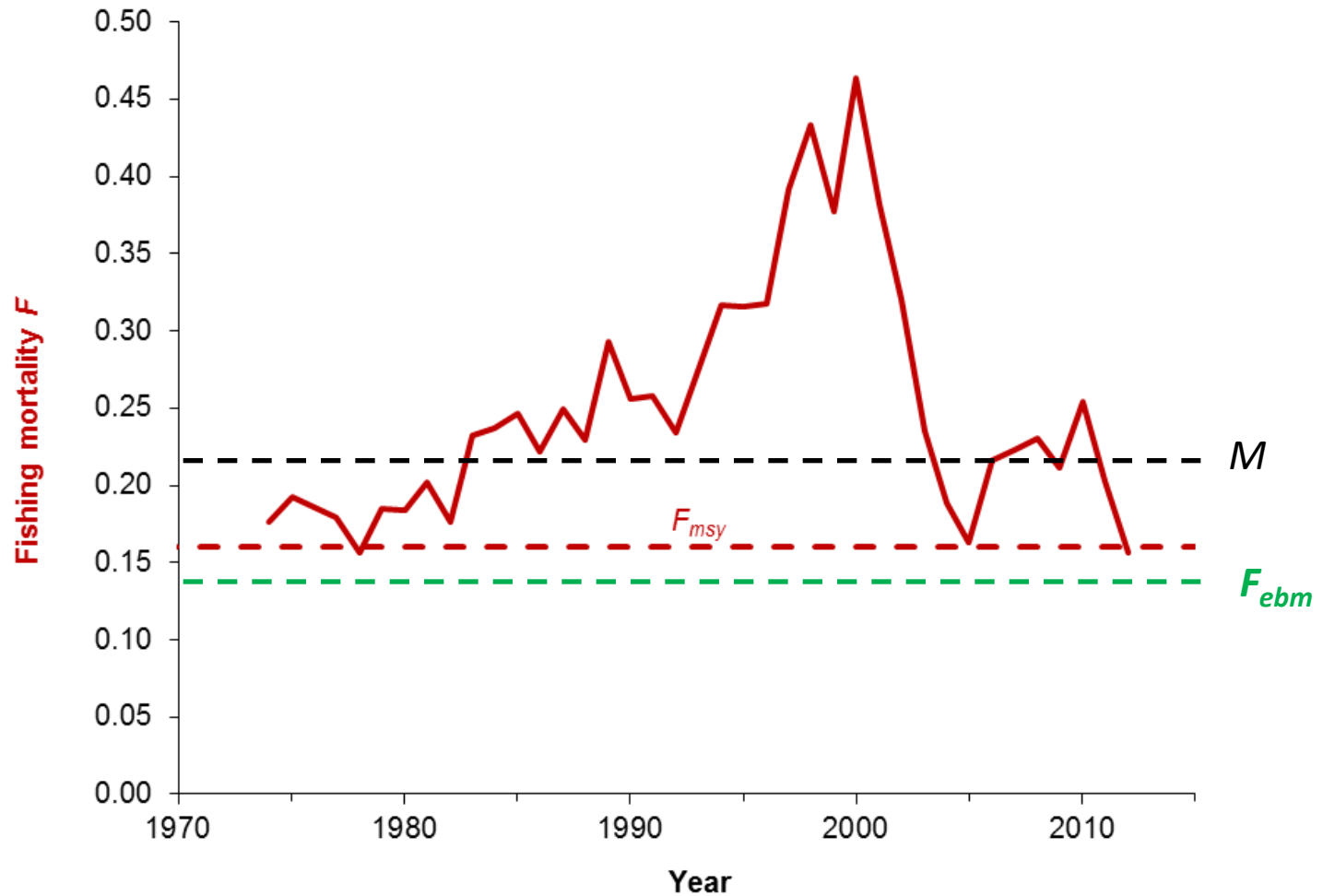


- *Sprattus sprattus*
- *Clupea harengus*
- *Gadus morhua*
- Other fishes
- *Saduria entomon*
- Other invertebrates

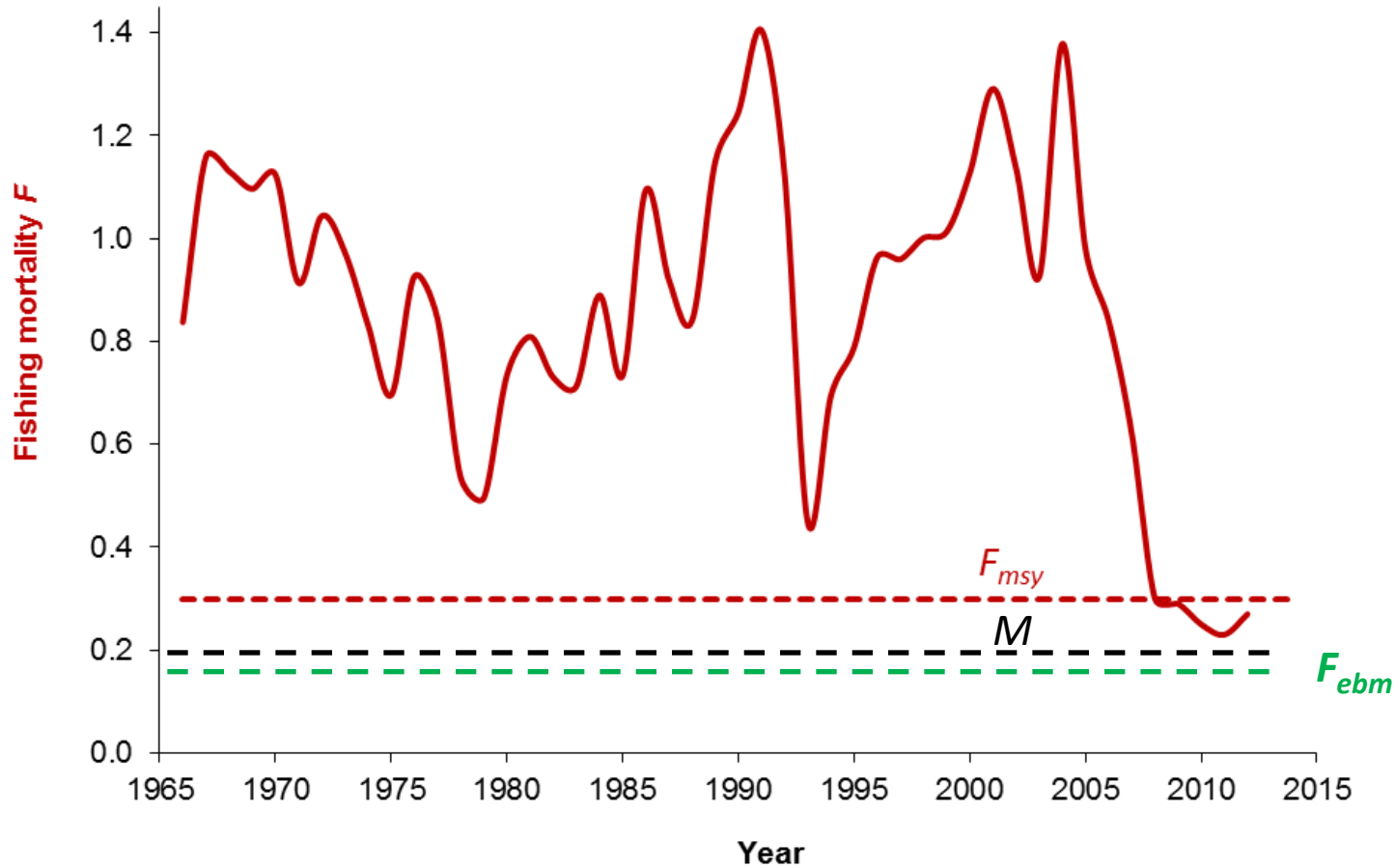
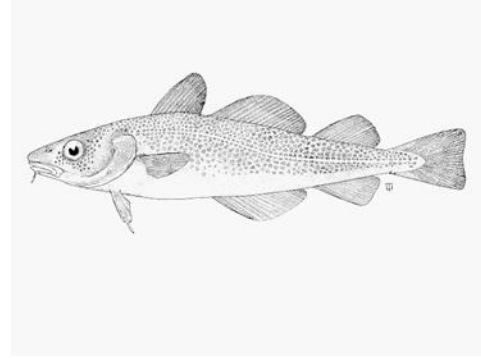
Baltic Sprat



Central Baltic Herring



Central/Eastern Baltic Cod



How about the *Pretty Good Catches?*

After the new F -values were applied for 3-5 years:

- Stock sizes of sprat, herring and cod will be (much) larger than today
- Catches of sprat will be slightly less than today
- Catches of herring and cod will be much larger than today
- The ecosystem will be more stable and resilient

Recent ICES Proposal for Multispecies Management of the Baltic

- Considers only sprat, herring and cod
- Uses multispecies interactions to maximize overall catch
- Ignores international agreements and European law (MSFD)
- Ignores principles of ecosystem-based management

Multispecies considerations for the central Baltic stocks: cod in Subdivisions 25–32, herring in Subdivisions 25–29 and 32, and sprat in Subdivisions 22–32

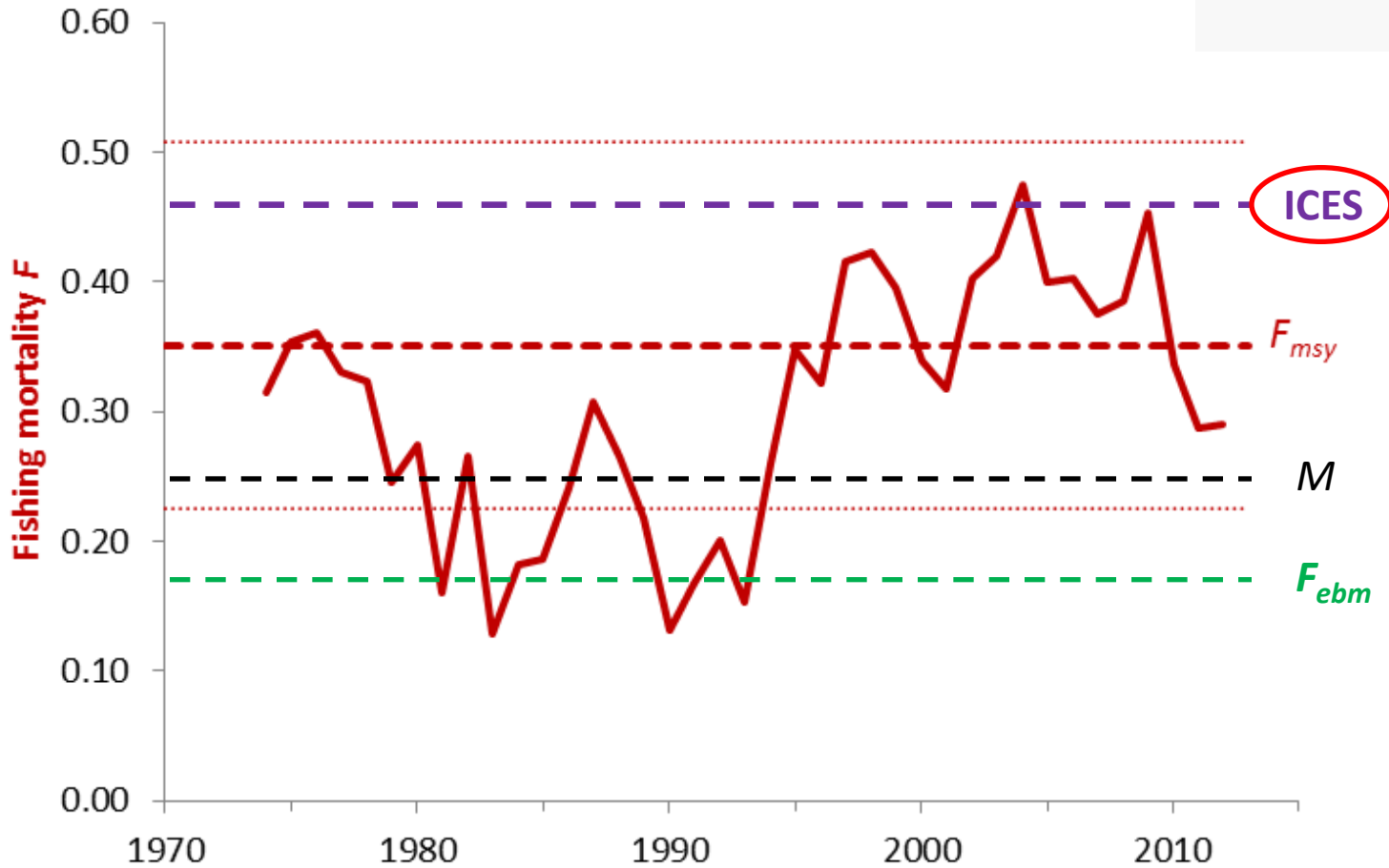
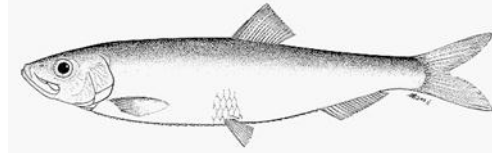
http://www.ices.dk/committe/acom/comwork/report/2012/2012/Baltic_multispecies_advice.pdf

....

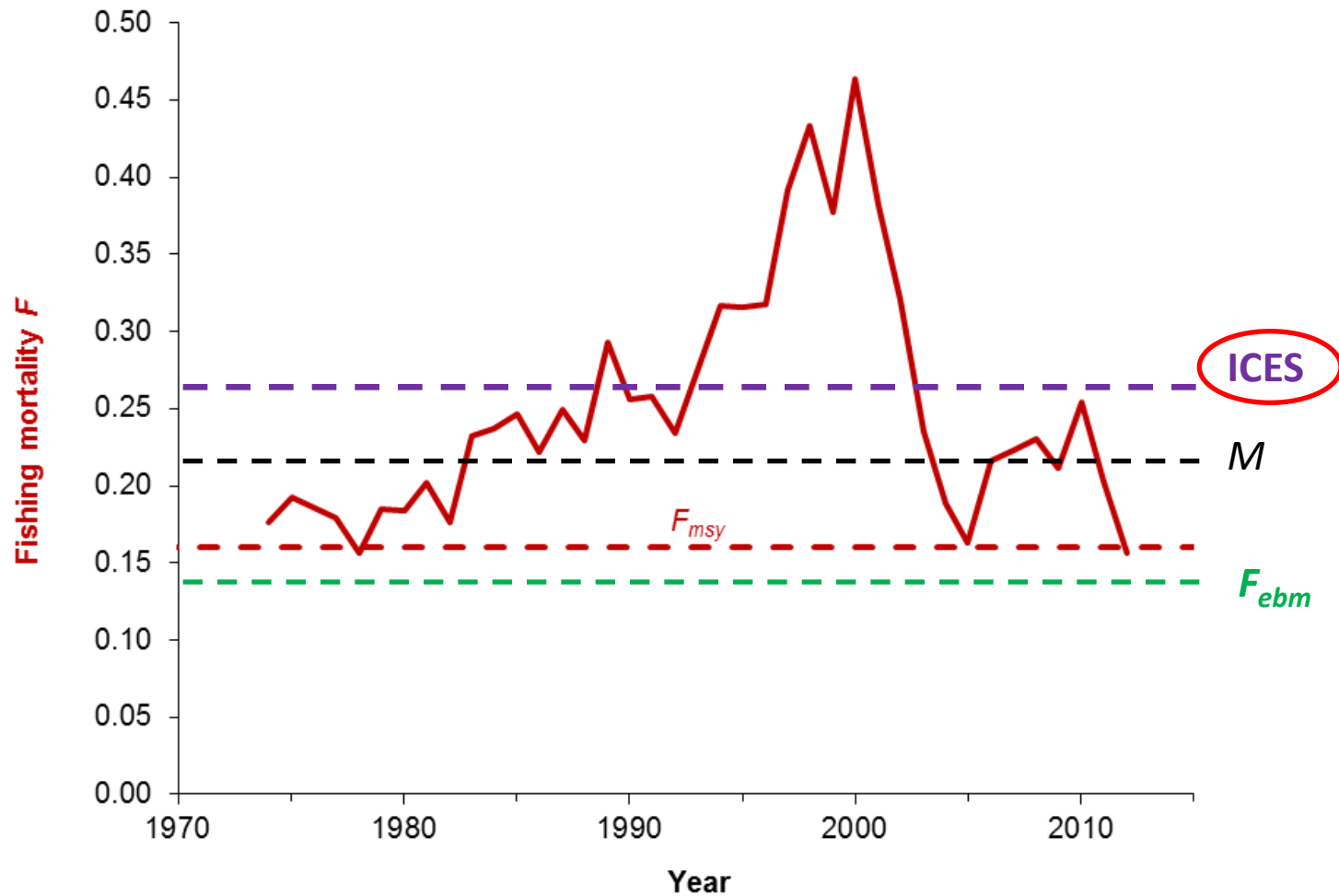
The preliminary modeling work reveals that the highest sum of yields of the individual species could be obtained with fishing mortalities considerably higher than the present single-species F_s (0.60–0.65 for cod, 0.26 for herring, and 0.46 for sprat). It should be noted that the yield of cod is not significantly higher and that at such high F_s the probability of SSB falling below a biomass limit is higher (Fig. 8.3.3.4) and there was no analysis conducted to explore the impact on other components of the ecosystem. It should further be noted that the effects on yields, and the corresponding F -values, are based on the assumption of constant geographical overlap of cod and clupeids, and on cod growth being independent of what it eats.

	<i>F_{msy}</i>	<i>M</i>	<i>F</i> proposed
Cod	0.30	0.20	0.60 – 0.65
Herring	0.16	0.21	0.26
Sprat	0.35	0.25	0.46

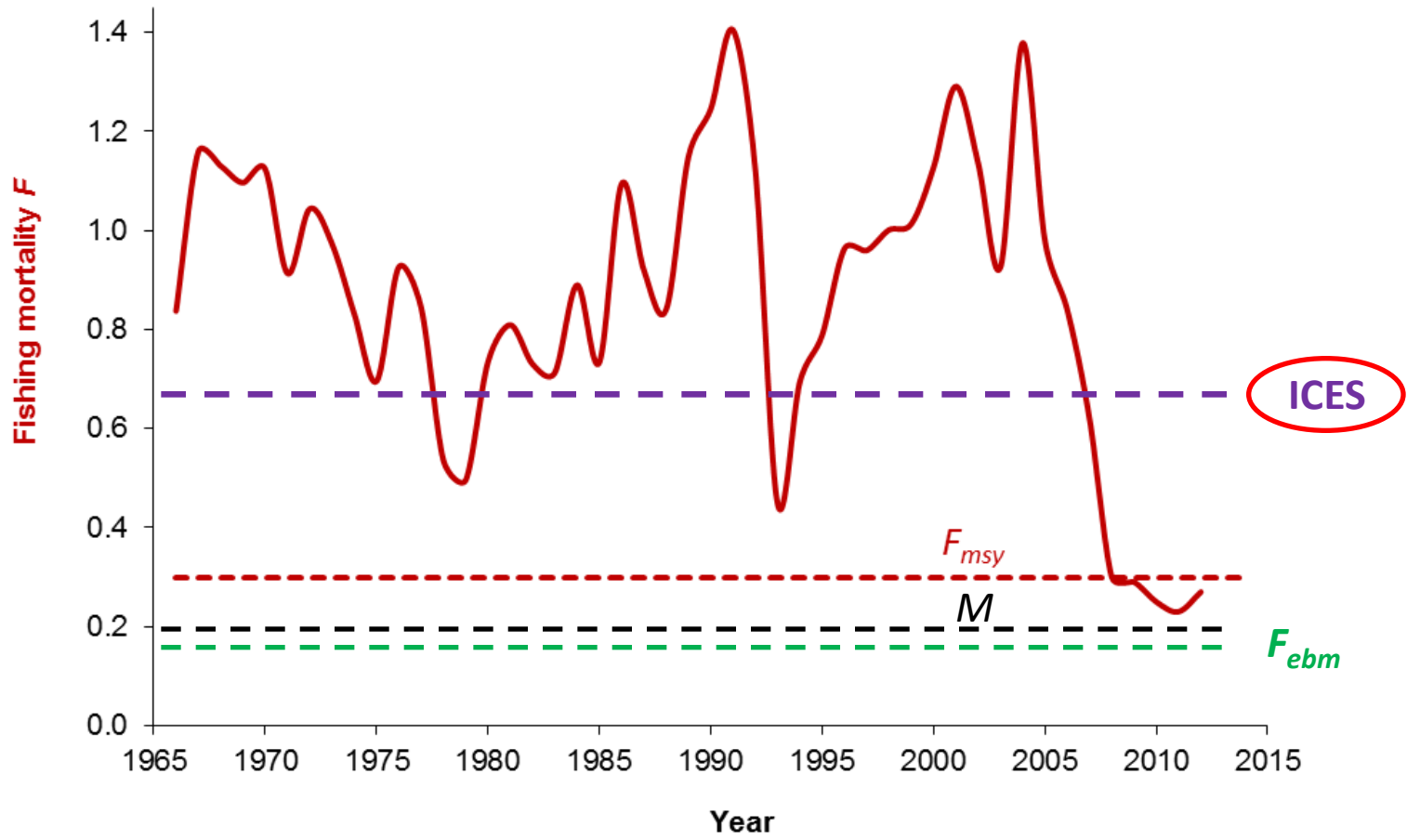
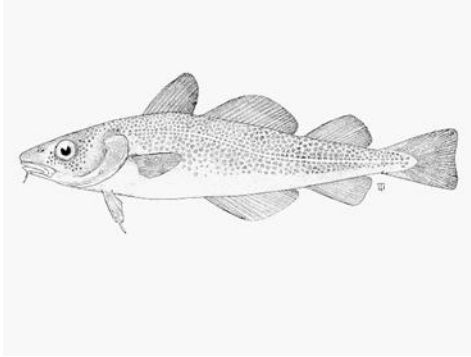
Baltic Sprat



Central Baltic Herring



Central/Eastern Baltic Cod



Conclusions

- The *MSY* concept is good and binding
- CFP reform does not live up to Rio +20
- Ecosystem-based fisheries management is compatible with the *MSY* concept
- The Baltic can serve as a model for EBFM
- The multispecies analysis of ICES is not EBFM but continues past overfishing

References

- Casini et al. 2008. Multi-level trophic cascades in a heavily exploited open marine ecosystem. *Proc. Royal Soc. B* 275:1793-1801
- Cury, P. et al. 2011. Global seabird response to forage fish depletion – one-third for the birds. *Science* 334:1703-1706
- Froese, R. and A. Proelß. 2010. Rebuilding fish stocks no later than 2015: will Europe meet the deadline? *Fish and Fisheries* 11:194-202
- Froese, R., T.A. Branch, A. Proelß, M. Quaas, K. Sainsbury and C. Zimmermann. 2011. Generic harvest control rules for European fisheries. *Fish and Fisheries* 12:340-351
- Froese, R. and M. Quaas. 2011. Three options for rebuilding the cod stock in the eastern Baltic Sea. *Marine Ecology Progress Series* 434:197-2011.
- Patokina, F. A., Nigmatullin, Ch. M., and Kasatkina, S. M. 2011. Adult cod as top-predator in the southern Baltic: results of the winter–early spring observations in 1992–2010. ICES CM 2011/I:32.
- Pikitch, E. et al. 2012. Little fish, big impact. Managing a crucial link in ocean food webs. *Lenfest Ocean Program*. Washington, DC. 108 pp.

Thank You

Questions?

Rainer Froese
GEOMAR

rfroese@geomar.de